Claims

1. A mass spectrometer system including a mass spectrometer device provided within an evacuated chamber, the chamber having an entrance port through which a sample may be introduced into the chamber and into contact with the mass spectrometer device, the system additionally including a permeable membrane located across the chamber between the port and the spectrometer device and a valve located between the membrane and the entrance port and having an normally closed state and an open state, such that, in use, the adoption of the open state allows the flow of the sample into the chamber through the membrane and into contact with the spectrometer device.

2. The system as claimed in claim 1 wherein the spectrometer device is formed from a MEMS device.

3. The system as claimed in any preceding claim wherein the valve is formed from a rupturable diaphragm sealing the evacuated chamber, the rupturing of the diaphragm breaking the seal and allowing the flow of the sample into the chamber.

4. The system as claimed in claim 1 or claim 2 wherein the valve is formed from a breakable glass member and an actuator, the glass member being located across the chamber and sealing the chamber, and wherein, in use, the actuator is adapted to come into contact with the glass member, breaking the member and consequently the seal.

5. The system as claimed in any preceding claim wherein the membrane is formed from a polydimethylsiloxane material.

6. The system as claimed in claim 5 wherein the polydimethylsiloxane material is formed as a liquid layer on a substrate, a polymerisation of the material on the substrate forming the membrane.

7. The system as claimed in claim 6 wherein the substrate is a metal mesh structure.

8. The system as claimed in claim 6 wherein the substrate is a silicon based substrate.

9. The system as claimed in any preceding claim further including a second evacuated chamber, the first evacuated chamber being located within the first evacuated chamber, the pressure within the first evacuated chamber being less than that of the second evacuated chamber.

10. The system as claimed in claim 9 wherein the second chamber includes an inlet and an outlet tube, the inlet tube being adapted to enable an introduction of a sample from outside the second chamber into contact with the spectrometer device located within the first chamber, the outlet tube being adapted to enable a venting of gas from the second chamber.

11. The system as claimed in claim 10 wherein a pump is provided on the outlet tube, the pump adapted to effect a reduction in pressure of the second chamber.

12. The system as claimed in any preceding claim wherein, in the normally closed position, the pressure within the evacuated chamber is less than 10^{-4} Torr.

13. The system as claimed in claim 11 wherein the pressure within the second chamber is reduced to about 10^{-1} Torr.

14. A system substantially as hereinbefore described with reference to Figures 1 to 3 of the accompanying drawings.